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10/764,092	01/23/2004	James Mitchell Tour	122302.00012 (UNTD-0029)	8256
25555	7590	12/12/2006	EXAMINER	
JACKSON WALKER LLP 901 MAIN STREET SUITE 6000 DALLAS, TX 75202-3797			LEUNG, PHILIP H	
			ART UNIT	PAPER NUMBER
			3742	

DATE MAILED: 12/12/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

3742

Part of Paper No./Mail Date 61208

DETAILED ACTION

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-4, 6, 7, 9-11 and 39-53 are rejected under 35 U.S.C. 103(a) as being obvious over Hjortstam et al (US 2002/0183207), in view of Sklyarevich et al (US 6,423,605) or Zhang et al (US 6,203,864) (all previously cited).

Hjortstam shows very feature as claimed except for the explicit showing that the carbon nanotubes are subjected to microwave radiation while in an inert gas chamber or a vacuum chamber. More particularly, Hjortstam shows exposing carbon nanotubes (paragraph [0037]) to microwave source the microwave radiation source as it states in paragraph [0031]:

By using electromagnetic radiation, such as microwaves or light to irradiate nanostructures, excited electrons are produced. The electrons in the valence band of semiconducting nanostructures absorb electromagnetic radiation and cross the bandgap to the conduction band, which leads to an enhanced conductivity. In semiconducting nanostructures absorption can only take place if the irradiating energy is greater than the bandgap energy.

The limitations "causing light emission" in claim 1, "causing mechanical motion" in claim 2, "causing reconstruction" in claim 3 and "outgassing absorbed or adsorbed species" in claim 4 are inherent functions and results in Hjortstam as it shows exposing carbon nanotubes (paragraph [0037]) to the microwave radiation source. Therefore, Hjortstam shows very feature as claimed

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except for the explicit showing that the carbon nanotubes are subjected to microwave radiation while in an inert gas chamber or a vacuum chamber. However, Sklyarevich teaches cooling the processed material with a cooled gas that did not have any influence on the activation process to reduce diffusion (page 6, lines 63-67). As to wherein the carbon nanotubes are subjected to microwave radiation while in a vacuum chamber, Sklyarevich teaches a vacuum chamber 10^{-4} (col. 5, lines 45-49; and Fig. 2). Similarly Zhang shows irradiating carbon nanotubes with electromagnetic wave in a high vacuum chamber or in an argon or a nitrogen (inactive gas) atmosphere (see the abstract, col. 4, line 8 – col. 5, line 12). Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the method of Hjortstam with wherein the carbon nanotubes are subjected to microwave radiation while in a vacuum chamber or in an inert gas chamber because this would have cooled the processed material with a cooled gas that did not have any influence on the activation process to reduce diffusion, in view of the teaching of Sklyarevich or Zhang. As to wherein the vacuum is between approximately 10^{-4} torr and 10^{-8} torr and the microwave frequency is between 0.1 GHz and 100 GHz, Sklyarevich teaches that a person of ordinary skill in the art can easily modify the installation for manufacturing processes of various scales (col. 5, lines 65-67; and Fig. 2). Thus, the vacuum and microwave frequency are result effective variables which one of ordinary skill in the art can determine to carry out the desired reaction. Furthermore, the claimed microwave frequency range is the industrial standard and the vacuum degree is similarly shown in Zhang (see col. 4, lines 43-47).

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3. Applicant's arguments filed 9-11-2006 have been fully considered but they are not persuasive. All that is being claimed is a single step of subjecting a nanotube to a microwave irradiation in an inert gas or vacuum chamber. Hjortstam clearly teaches to use microwave to irradiate nanostructures including nanotubes. Although it does not specify the use of an inert or vacuum chamber during the microwave irradiation, such would have been obvious in order to prevent undesired reactions as it shows the use of vacuum during a treatment with nanostructures such as, intercalating nanostructure with an alkali metal in a vacuum chamber (see paragraph [0024]) and heating nanostructure in a vacuum (see paragraph [0027]). Sklyarevich and Zhang are further examples to show the use of inert or vacuum for treating materials with nanotubes with an electromagnetic wave to reduce adverse effect. Therefore, the use of a protective environment in the Hjortstam process would have been a basic engineering fundamental well within an ordinary skill with these references before him/her.

4. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).


A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Philip H. Leung whose telephone number is (571) 272-4782.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robin Evans can be reached on (571)-272-4777. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Philip H Leung
Primary Examiner
Art Unit 3742

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12-8-2006